

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

PACIFIC INDEMNITY COMPANY,	:	CIVIL ACTION NO.
	:	04-11975(RWZ)
Plaintiff,	:	
v.	:	
ALFRED KEMP, Individually and d/b/a	:	AFFIDAVIT OF
KEMP PLUMBING	:	THOMAS W. EAGAR
	:	
and	:	
MARTIN SANDBORG, Individually and d/b/a	:	
SANDBORG PLUMBING AND HEATING,	:	
	:	
Defendants.	:	

Thomas W. Eagar, being first duly sworn, states:

1. I am a Professor of Materials Engineering and Engineering Systems at Massachusetts Institute of Technology. I received my Bachelor's in Metallurgy and Materials Science from MIT in 1972, and received my Doctorate in Metallurgy from MIT in 1975. I have been a member of the faculty of the Department of Materials Science and Engineering at MIT since 1976. A copy of my *Curriculum Vitae* is submitted as Exhibit "B" to this Affidavit.

2. I issued a report dated February 24, 2006 setting forth my professional opinions relative to this matter, and the grounds for those opinions. I understand that a copy of my February 24, 2006 report is attached as Exhibit "B" to Plaintiff's Motion in Limine to Exclude Certain Testimony From Defendant Kemp's Experts Quinn Horn and Timothy Myers in this matter. (Document 16).

3. After issuing my February 24, 2006 report in this matter, I reviewed a copy of the Rule 26 report prepared by defendant Alfred Kemp's metallurgical expert, Quinn Horn, a copy of which of I understand is attached as Exhibit "A." Following review of Dr. Horn's report, I issued a rebuttal report dated March 13, 2006. I understand that a copy of my March 13, 2006 report is also already on file in this matter as Exhibit "E" to Document 16, referenced above. It

is my understanding that plaintiff's counsel has agreed that I would not testify upon direct examination at trial to the matters set forth in Subparagraph 1(c) of my March 13, 2006 report. With that qualification, the matters set forth in my February 24, 2006 and March 13, 2006 reports on file in this matter represent opinions and conclusions which I hold to a reasonable degree of scientific certainty and to which I intend to testify at the trial of this matter.

4. Figure 21 on Page 21 of the Horn Report (Exhibit "A") is an EDS spectra taken from a cross-section of the solder layer from what had formerly been the soldered joint between the cold water shutoff valve and the copper riser to which that valve had originally been soldered beneath the kitchen sink of the Marino carriage house. The specific location of Figure 21 is denoted by a red arrow labeled with the number "1" on Figure 20 on Page 20 of Exhibit "A." Figure 21 indicates that there is no lead at this location. If lead had been detected in the EDS spectra, there would have been a peak on the spectra designated with the atomic symbol for lead, "Pb." As would be expected with a solder composed almost entirely of tin, the most prevalent element in Exhibit 1 is tin, which has the atomic symbol "Sn."

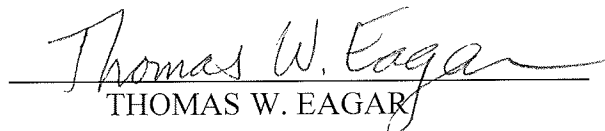
5. I have reviewed all of the results of the EDS analyses of plumbing components recovered from the kitchen sink cabinet in the Marino carriage house, which were performed at Massachusetts Materials Research in January, 2006 at Dr. Horn's request and under his direction. None of these analyses indicate that any solder which formerly formed the soldered copper-to-brass joints at either end of the cold water valve assembly which was found lying loose on the bottom of the kitchen sink cabinet in the carriage house following the fire consisted of a tin/lead alloy even remotely approaching the proportions of 74% tin/26% lead (by atomic percent) or 63% tin/37% lead (by weight) as theorized at Page 34 of the Horn report. No lead was detected in the only EDS scan of a cross section of a solder layer from one of the brass-to-copper joints (Figure 21, discussed above), and there is no data suggesting the presence of lead in the solder layer of any of these joints sufficient to lower the melting point of the solder significantly below that of pure tin, as reflected in the "lead-tin phase diagram" depicted at Figure 33 on Page 36 of the Horn report (Exhibit "A").

6. The data generated by Massachusetts Materials Research confirm the opinions and observations set forth in my March 13, 2006 rebuttal report (Exhibit "E" to Document 16). For example, the limited quantity and sporadic location of lead in the brass valve and fitting (see Horn report, Exhibit "A," Figure 20, and the "schematic" set forth at Figure 34), particularly at the brass-solder interface, preclude the formation of a layer, or "film" of lead/tin alloy at the brass-solder interface. Also, in the limited locations where an alloy could form between exposed lead deposits in the brass and the tin in the solder, the proportion of lead in the alloy would be established by the temperature of the molten tin solder at the time of original solder application. Because the melting temperature of the primarily tin solder would be very close to that of pure tin (as reflected on the lead/tin phase diagram, depicted as Figure 33 to Exhibit "A"), only a small proportion of lead could alloy with the tin in the solder (and, as noted previously, alloying would only occur at sporadic locations) and the melting temperature of any lead/tin alloy thus formed would not be appreciably less than the melting temperature of "pure" solder.

7. Attached as Exhibit "C" is a copy of a photograph which was marked Kemp Deposition Exhibit "11," which depicts the area beneath the kitchen sink of the carriage house following the fire. The cold water valve assembly is circled in red and marked with an arrow labeled "1." The copper pipe or riser with the unmelted solder ridge on it that is referenced in my report and in the Horn report, to which the cold water valve assembly had originally been soldered, is also circled in red and marked with an arrow labeled "2."

8. Attached as Exhibit "D" is a copy of Kemp Deposition Exhibit "7," which is a reconstructed version of Exhibit "C," showing the cold water valve assembly in its originally-installed position. All of the leaded-brass valves which appear in Exhibit "D" have been circled in blue. According to Mr. Kemp's testimony, he would have installed all of these valves at the same time that he installed the cold water valve assembly. The soldered joints between these valves and the copper tubing to which they are connected are all "brass-to-copper" solder joints which are metallurgically indistinguishable from the now-unsoldered joint between the cold water valve and the copper riser to which the cold water valve had originally been soldered.

9. A blue square has also been placed on Exhibit "D" around the brass compression fitting located at the end of the hot water valve assembly on Exhibit "D." This compression fitting is identical to the compression fitting which was unsoldered from the cold water valve assembly from beneath the kitchen sink, and is depicted in Figures 4, 8, and 27 of the Horn report (Exhibit "A"), and the EDS analysis of which is depicted in Figures 29 and 30 of the Horn report. Again, the "copper-to-brass" solder joint between the hot water valve assembly and the compression fitting depicted in Exhibit "D" is metallurgically indistinguishable from the joint between the cold water valve assembly and the corresponding fitting which was observed to be unsoldered and separated following the fire.


THOMAS W. EAGAR

SWORN TO AND SUBSCRIBED

Before me this 18th day of
August, 2006.


NOTARY PUBLIC

